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REVIEW OF THE

TELEGRAPH AND TELEPHONE

A JOURNAL OF ELECTRICAL, SCIENTIFIC AND MECHANICAL NEWS.

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Possession.

He who has longed for a star
Cares not for the light of the sun;
He who has found hopes afar
Heeds not the present things won.

Who listens to songs angels sung,
Heard only by spirited ear,
Cares never again for the tongue
Of mortal, though blessed and dear.

'Tis only the life unattained,
'Tis only the music unhymned
We love, when either is gained
Possession the beauty has dimmed.

MINNIE C. BALLARD.

ELECTRIC LIGHT

The proprietors of the Royal theaters in Berlin are negotiating with the firms Siemens & Halske and Landau & Rathenau (representatives of the Edison Electric Light Company) for illuminating the Royal Play-house and Opera-house by incandescent electric lamps, and the decision depends only on the possibility to find a suitable place to fit up the electric generators and on the sanction of the whole enterprise by His Majesty the German Emperor.

In the *Berlin Aquarium* trials with electric illumination have taken place and the result was so satisfactory as to hold out a prospect of permanent installation of electric light in this remarkable establishment for the near future.

An international exhibition will be opened in Calcutta, India, next December, and will close on Feb. 29, 1884.

In a couple of hundred years from this, if the Bible is again revised to suit the times, the passage in the parable of the ten virgins, which reads thus: "Give us of your oil, for our lamps have gone out," will be changed to, "Give us of your electric lights, for our circuit is temporarily broken."

A Chicago drygoods clerk won't touch an electric wire with an iron rod again. He isn't mad, but he says he never desires to be reminded again of the first time he drank Chicago whiskey.

"The first practical application in Scotland of the electrical transmission of power to a distance, in every-day use has just been made at the works of the Railway and Electric Appliances Company, Polmadie, Glasgow, by Mr. Rankin Kennedy, electrician and engineer, formerly of Paisley and Kilmarnock. By means of two dynamo electric machines, designed and made by him at the Polmadie Works, a power of from four to five horses is transmitted from the line of shafting of the turning and fitting shop of the works to the department occupied by the carpenters and pattern makers on the opposite side of the yard of the works. Thus transmitted the power is used by those workmen for driving the large saws used in cutting their wood, and it is completely under their control. In this example of the electrical transmission of power, there are used two of Kennedy's dynamos. One of them—the generator which supplies the electricity—is placed on the floor of the turning shop of the works, and is driven by a belt from the line of shafting which drives all the machinery of the works. This generating machine runs all day, and from it two copper wires are led away to the carpenters' and pattern-makers' shop, where they are fixed and connected to the other dynamo, which, as in the former case, is also on the shop floor. This second dynamo is the motor which receives the electricity from the first, the shaft of the motor dynamo being caused to revolve at a speed of 600 revolutions per minute. A belt from the pulley on this shaft drives the saws when the current is turned by the switch-handle."

The Brush Electric Light Company at the Lower Falls, Rochester, N. Y.

Reference has already been made to the work which is being done at the Lower Falls by the Brush Electric Light Company, but no adequate idea has been given of the extent and nature of that work. On the summit of the cliff just below the falls on the west side of the river, stands a new brick building 42x100, in which are to be placed twenty-one dynamo machines for the purpose of manufacturing electricity. Under this building the company is digging a wheel-pit six feet square, which will have ninety-four feet head, thus furnishing one of the finest water powers in the city. Already seventy-five feet have been dug through solid rock and the work of completing the excavating is being pushed with all possible haste. In the bottom of the pit will be placed two turbine wheels twenty-four inches in diameter and each having over 550 horse-power. They are made of bronze and gun metal so as to endure the terrific speed to which they are to be subjected, namely, five hundred and eighty-two revolutions per minute. They will be arranged so that both or each can be run as the necessity shall require. At the top of the pit are to be placed two large bevel wheels weighing six tons each. The main pulley will be connected with the machinery in the building with a belt fifty-four inches in width. All the machinery is to be on this extensive scale, and the high rate of speed to which it will be run necessitates that it be of the best quality and placed in position in the most skillful manner.

No idea can be formed of the pit except by visiting the place. By invitation of George A. Redman, Superintendent of the Brush Electric Light Co. in this city, two newspaper men visited the works recently and enjoyed, if enjoyment consists of such trips, a ride down through the pit. Taking a winding path just south of the brick building, they soon found themselves standing beside the mouth of the pit. The opening is covered with plank, except a small hole, through which runs an elevator consisting of a square box attached to a heavy rope, the whole being run by water power. Of course the visitors did not question the safety of the arrangements, and deliberately stepped into the car—deliberately, for they imagined they were coolly walking into the jaws of death. The machinery was set in motion, but the newspaper men thought the bottom was falling out of the car, and they clutched all the tighter to the rope which held them suspended between the heavens above and the rugged rocks below. About thirty feet down the pit is an opening looking out under the falls. At the bottom of the pit men are busily engaged in excavating, A large steam drill is used which drills one foot into the solid limestone each minute. About one hundred and twenty-five feet are drilled each day. Dynamite cartridges are used, and about twenty are discharged by electricity at the same time. Tons of rock are lifted out, the discharge fairly shaking the earth. At the bottom of the pit a beautiful view of the falls, the river and the eastern cliff overhanging them is obtained. The snow and ice lend a double charm to the scene. To the right, as one faces the river, is a deep cave extending into the cliff fifty feet. "All aboard" prevents further investigation, and all make a rush for the car. A different sensation is experienced in being elevated. One is in mortal fear that one of the corners of the car will catch on the side of the pit, thus overturning it and hurling the occupants to the rock fifty or seventy feet below. As the knights of the quill stepped upon the scaffolding over the top of the pit they breathed easier, and departed homeward only to have visions of the ride down the "bottomless pit" haunt them all the restless night.

The Brush Electric Light Company has been engaged all the past summer and fall in prosecuting this work. Some of the machinery has been received and will soon be put in position by Joseph

Cowles. Only about nineteen feet more of the rock remain to be excavated, and when all is completed the company will have in this city the best lighting station in the country.

The Electrical Patents of 1882.

The year just expired has been remarkable for the number of patents issued in the department of electricity, a greater number than in prior years having been allowed.

The field is daily growing wider, seeming apparently to enlarge by what it feeds upon.

The total number issued was 1,153. These may be classed as follows:

Electric lighting	258
Telephonic apparatus and appliances	141
Magneto and dynamo-electric machines	110
Conductors and cables	86
Batteries	54
Regulators and governors	54
Switchboards and circuit-closers	52
Miscellaneous applications of electricity	49
Telegraph apparatus	45
Receiving telephones	33
Transmitting telephones	29
Annunciators, indicators and recorders	27
Duplex and quadruplex telegraphs	28
Railroad signals	26
Electro-magnets and motors	23
Alarms and signal bells	21
Systems of telegraphy	17
Electric gas-lighting	16
Printing telegraphs	15
Fire alarms	15
Lightning rods and arresters	12
Insulating materials	11
Therapeutics	10
Burglar alarms	2
Electric clocks	7
Magnetic grain separators	5
Total	1,153

It will be seen from the above enumeration, in which the numbers are arranged in a sliding scale, that electric lighting is now the most popular subject for invention, telephonic appliances taking the second place a long way down the scale, and electricity generating machines coming in an easy third.

The yearly list of patents is an unerring index of the subject which is at any time most prominently before the inventing public.

In the early days of telegraphy comparatively few patents were issued, electricity being then a very insignificant class; those, however, which were granted were almost universally for improvements in telegraphy.

As time passed on, telegraphic repeaters came to the front, and for a long time held the van of electrical invention.

In 1868 the duplex took its turn of transitory popularity, being rapidly followed by improved printing instruments; inventions in automatic and chemical telegraphs; they, again, giving place to district call signals, and automatic fire alarms.

From 1876 to the end of 1881 telephones, combined with apparatus for their operation, held undisputed sway, but have now evidently yielded to the electric light.

This must again, in the course of nature, be succeeded by electro-motion or the electric transmission of power, to which we are even now tending; and before the young and enterprising inventor of to-day is transformed into the "lean and slippered pantaloon," if we are to judge of the future by the past, we shall see even more wonderful and surprising developments in this apparently inexhaustible field of research.

It is not a very bold prophet that nowadays undertakes to foretell the wonderful feats which this most wonderful agency is in the near future destined to achieve.

Already we have seen ploughs driven by electricity; passengers transferred from place to place on an electrical railway; friends talking at their ease, while remaining hundreds of miles apart; ponderable matter and its laws defied, by using sunbeams as mediums of electrical oral communication, and electrical energy carried about in a box; and many of those who are in the forefront of science believe it to be but a question of time when we shall not only converse and travel electrically, but also be able, by suitable and simple appliances, put an electric glass to our eyes, after the fashion of the Arabian Nights, and see whatever we choose to or wish for.

WASHINGTON, Jan. 6th, 1883.

Editor The Telegraph and Telephone Review, New York.

DEAR SIR—Referring to a lecture by Mr. Pendleton, before the Society of Arts, at Boston, Dec. 14th ult., Professor Cross is reported as stating that it was the first public lecture ever given in which the storage battery was used. I beg to say that in a lecture at the London Institution, Thursday, March 2d, 1882, Professor W. E. Ayrton, instantly and brilliantly illuminated 50 incandescent lamps of 40 candle power each, and eight incandescent lamps of 16 candle power each, from storage cells. He also illustrated the transmission of power, driving a lathe, circular saw, and doing other like work, from storage cells.

Very truly yours,

CHAS E. BUELL.

"The coming metal," as aluminium is called, would almost drive iron out of the market could it be produced at the same cost. The greatest interest is felt in the cable report of a discovery of a new way to separate it from the mass of common clay, in which it exists in unlimited quantity, and if its production is made comparatively inexpensive, its introduction will effect marvelous industrial changes. Its lightness and freedom from rust make it vastly superior to iron for many purposes. Attention has recently been called to the fact that it is a much better conductor of electricity than iron, and were it to replace the present telegraph wires the battery power could be reduced to one-seventh of that now required. Its value in conducting electric currents for purposes of illumination has not been suggested.

Our esteemed correspondent, Mr. C. Biederman, of Berlin, furnishes a number of very interesting articles and electrical items for this edition.

German News.

There was incorporated in Berlin, October 28th, a company which purposes the exploration and maintaining of new inventions according to electricity and its applications. The company is founded with a capital stock of 100,000 marks ($25,000, and there are issued 200 shares of 500 marks each. The board of directors is composed as follows: Otto Rabe and Max Emil Unger, both merchants in Berlin.

In the monthly meeting of the "Electrotechnische Vercin" of Berlin, October 27, Mr Von Hefner-Alteneck made a communication on "Electric Lighting of Streets." He gave at first a historical review of the growing of this kind of lighting, which only ten years ago was held impossible, and which started with the trials by "Jablochkoff-candles" at Paris. In 1879 the "Kaiser Gallerie," and the "Pariser Peaty" in Berlin were lighted by Siemens & Halske's differential arc-lamps, and in 1882 the first street lighting by incandescent electric lamps on the European Continent was effected in the "Kochstrasse" in Berlin by the same inventors. It was intended to illuminate also the places before the Arsenal and the Royal Opera, but the city government would not allow them to use these noblest places of the town for a field of experiments. In consequence of these very respectable reasons, the new kind of illumination was established at Berlin much later than it was expected, but the new improvements and important results of study in this branch could be considered and applied, and so the illumination of the "Leipziger Strasse" in Berlin, which began in the last week of September, 1882, surpassed all the others, as, for instance, that of Paris. The dynamo-electric machines are actuated by gas engines for the purpose to give an idea of the proportion between the want of gas for gas-lighting and that for electric light. The results of this comparison have stated that the same quantity of coal gas used to actuate an electric lighting apparatus gives *six to ten times* the intensity as if it is burned directly. One of the Siemens arc-lamps is placed on the same space where usually three gas-lanterns spend their flickering light. Each of these lamps, which gives an intensity of 880 candles—measured under an angle of 30°—causes an expense of about 10 cts. per hour.

The German Imperial general management of the Post and Telegraph has expressed the desire that the license for trying experiments in electric lighting may depend on its consent in order to secure the telephone and telegraph service from disadvantageous interruptions.

Since November 28th, the northern part of the splendid "Wilhelmstrasse" in Berlin is illuminated by 90 of Edison's incandescent lamps, each of 32 candles. These 90 lamps are installed into 30 lanterns, three in each. The whole length of the underground cables (on Edison's system) is not quite half a kilometer and is laid on both sides of the street, which is crossed only once by the line. The dynamo-machine is one of the size for 250 lamps.

With respect to the controversy between Siemens and others about the priority as inventor of the dynamo-electric machine, Dr. Werner Siemens published a letter as follows:

"*January* 17, 1867.—I have communicated circumstantially to the Academy of Sciences in Berlin, the theory of the dynamo-electric machine, after having demonstrated already in the end of December, 1866, to many members of the Academy, such a machine in full work within our factory. Not yet being a member of the Academy myself at that time, Professor Magnus offered to carry the fact before the Academy in the first meeting after the recess (January 17, 1867). This was the first publication about the principle, and I proposed then for the first time the new name "Dynamo-electric" machine. At my request, and caused by my communication, my brother, Dr. Charles William Siemens, announced in the end of January, a lecture on this matter in the Royal Society in London. Nearly a fortnight later Professor Wheatstone announced a lecture too on the same matter in the same society. Both William Siemens and Wheatstone held their lectures, and it is true William Siemens at first announced it. Both produced engines in work, which were provided just like my first engine, with the Siemens-armature. From this double lecture it was concluded in England that Wheatstone and I had made the invention and published it contemporary. That is wrong, indeed, because my first publication by the Berlin Academy was nearly one month older."

Dr. Siemens announces his intention to maintain his claim of priority if no authenticated facts are opposed.

The new city theatre in Brunn (Austria) was opened on November 14th, with great solemnity under participation of a brilliant society; the splen-

did house, the electric light, the various new arrangements, the festival play, all took prodigiously. The electric lighting of Edison proved to be sufficiently skilled in all demands; the lighting machinery of the stage worked excellent, and the people were delighted. Besides it is also made use of the voltaic arc-light, but only before this theater, whilst the incandescent light is employed inside, and not only in the hall and on the stage, but also in the vestibule and in the green-room (foyer); "for," says the Vienna *Neue Freie Presse*, "though the bluish-white arc-light in its brightness is a good subduer of darkness, it is at the same time a mischievous corrupter of colors."

The municipal authorities of Brunn make a great saving by introducing electric light instead of gas light, for the latter would have cost about $6,950 per year, while the electric light on the contrary costs only $3,750. C. BIEDERMANN.

Telegraphing Without Artificial Lines.

To the Editor of the Review:

DEAR SIR,—While in England during the past summer, seeing the sights and regaining health in that delightful old country, through the courtesy of pleasant acquaintances I chanced to meet—among the number I take pleasure in counting that noble English gentleman, J. Wilson Swan, and his coequal in good graces, Prof. S. P. Thompson—I had opportunities of knowing what was new in electrical novelty and discovery.

Of such as came under my observation I will incicidentally mention two, that have a direct bearing upon the subject of this communication—I refer to the repetition of Lindsay's experiments (on the Tay at Perth, and the Dee at Aberdeen, 1850) by Mr. Preece telegraphing between Southampton and the Isle of Wight without a connecting cable, which has been reported by our current scientific journals; also the operating of the telephone to a surprising distance on open circuits, the result of which was marvelous indeed, but not, I believe, at present of commercial importance. Who is prepared to say to what these apparently chimerical effects will lead when, as we often see, the practical application of our success makes possible the success of another, before impossible.

Many an idea which a few years ago seemed bold and preposterous, has since proved not only scientifically interesting, but commercially valuable. The signs of the times certainly prove it to be a wise course to push anything that promises well, even in theory, to satisfactory experimental conclusions.

Knowing that the individual success of co-laborers seeking to do a certain thing, increases the chances of its final consummation, and emboldened by the efforts of the great in science, I will relate, if you will allow me the space, the result of an experiment yours humbly tried with a view of commuicating electrically without artificial lines.

About the time that incandescent electric lighting was being developed for domestic purposes, I conceived the idea above referred to, but have since found that I was anticipated by a number of years; but the way I thought of doing it I am not aware of its ever having been proved, and that was by using the radiating light mains and ground for the circuit. I was, of course, met by the generally accepted hypothesis that the earth acted as a reservoir and not as an actual conductor of currents, but some of the manifestations of the telephone has demonstrated beyond a doubt, that currents of electricity actually traverses the earth's crust, and I tried an experiment which proved to my own satisfaction that not only was such the case, but that telegraphic communication could be maintained independent of especially constructed lines within the limit at least of an electric lighting system, or from one system to another of equal potential. The idea anticipates the general introduction of electricity for domestic purposes, generated at and distributed from a central station—the incandescent using metallic multiple arc circuits preferred—my experiment was tried in such a system, namely, the Edison.

I take any two points of a lighting system and in a lamp loop or cross circuit (which I prefer because the electrical conditions to its loop are practically the same throughout a properly regulated and planted system in the mains, this is not so), at these points I place a resistance which may be varied and predetermined by knowing the resistance of earth between the two communicating points; between this arrangement and a good ground I place a key which will connect at will, alternately, the positive or negative side of said resistance with the ground when operating or receiving, respectively. It will thus be seen that I get a practically constant, easily regulated shunted current through the earth from one point to another, from an operator to a receiver which is made positive or negative at will, and no connecting metal circuit, except the existing light system. Substantially such an arrangement I operated through some 70 feet of earth, with no better ground than a No. 10 wire forced into moist earth; to what distance this can be done, and with what delicacy with a view of operating the telephone in this way, I am unable, at present, to state, but hope at no distant day to have the facilities to show that when the electric lights are run on metallic circuits, as they generally are, and the telephone on metallic circuits as they should be, it will be possible to communicate without especially constructed lines, not only between two individuals, but many at one and the same time; but for the circulation of important news from a central point to many receivers as stock printing, from what I know I have faith to believe that this can be done substantially as I have described, thereby doing away with the entanglement of overhead or underground wires, with possibly the necessity arising of having especially devised instruments.

Very truly yours,

21 Park Row, N. Y. S. D. MOTT.

Electricity.

What lightning abhors and what electricity abhors is water. Still we are told, and the fact is undisputed, that water is a conductor and that glass is a non-conductor. We use the glass and the lightning rod or telegraph wire together because they act as one; if the glass were not a conductor as well its contact would divert the current, consequently it is as much a conductor as the lightning rod, as both conduct both should be called conductors. So of water; we are told that a lightning rod is put into the ground where it is damp that the water or dampness may conduct it, but instead of conducting it it is the best element to kill it, and this is the use that it answers, the vacuum current that jumps in water the narrow space from wire to wire is not done by the conductivity of the water, but despite it—as the interval must be just in proportion to the strength of the current—if increased the leap cannot be made; if water was a conductor, the greater the interval the greater the conductive power. And so we have by the same perversion a substance like amber that attracts called a negative—why call the active power a negative? In powder the three ingredients nitre, sulphur and charcoal, containing little moisture and being also of different temperature, when brought together and acted on by heat explodes—it is an attempt to combine by fire three temperatures that refuse to fuse. The phenomenon seen in winter when a comb is run through the hair and the spark is produced, is due to the fact that three dry substances, the hair, the comb and the hand, each of different temperature, are brought in contact by friction. The disturbance produces the sparks. If the friction is continued any time, the sparks will be found to diminish just in the proportion as the temperature of the three becomes equalized by the friction or heat; this effect cannot be produced in summer, the hand and the hair containing too much moisture. We are told that by running our feet over a carpet we charge our body with electricity from the carpet, and by this means we are able to light a gas burner. This is incorrect. By running round the room with the index finger standing alone we make it still more dry, which is already comparatively dry in winter, and then the dry finger, the dry gas burner and the dry gas is ignited, when in contact, by the dry warm air of the warmed room. We could dry the finger as well by sitting in a chair and making the finger cut the air. We also have it given to us in treatises on electricity that a certain woman by putting her finger in line contact with a brass knob upon a heated stove was discovered to be able to cause sparks to proceed from her body through her finger to the knob, and that the exercise after a while became exhausting to her, whereas no spark ever proceeded from her body. A human body cannot produce a spark, but was produced by contact or near contact of her dry, bony finger, the temperature of the brass knob and the iron stove all being different and being excited thereto by the heat of the air. Neither can electricity enter a body; the spark is a vacuum particle made a spark by the warm air. Neither can electricity enter the body, as its humidity repels it. That explains the electric shock; the electricity is abrubtly stopped. Persons killed by lightning have not so much as a hair scratch to show its effect, and it has the whole surface of the body to oppose it. When it is said that a mark has been made it is a misapprehension; it is attracted by the dry clothing when every thing else that is exposed is wet. GEO. LE CRONIER.

A new line is proposed between Europe and America, *via* Labrador, Iceland and the Faroe Islands, and there will be sure to be well qualified persons required in these interesting northern regions. Colonel Shaffner suggested something of the kind many years ago, but it looked too bold, not to say impracticable, at that time of day, and nothing came of it. It seems a simpler matter now, and the proposal as laid before the Danish Geographical Society by a well-known electrician, seems very likely, before long, to become a scheme for practical accomplishment. The original idea was to carry a line direct from Norway to the Faroe Islands, and thence, by way of Iceland and Labrador, to America. That first long stretch of line has, however, been abandoned in favor of one from Norway to the North of Scotland, and thence to the Faroe Isles, thus diminishing the risk of giving a valuable half way house. Submarine cables were hazardous things to attempt when the first idea of such a line was put forth. Nobody thinks much of them now, however, and the whole length as now proposed would go under the sea instead of overland, as Shaffner would have carried his wherever he could. The dreary regions across which overland lines would have to go would scarcely permit of their being kept in working order, and it is thought, too that they would be seriously influenced by the aurora borealis, though it does not seem quite clear yet that the mere laying of the lines under water instead of overland would materially protect them from this electrical phenomenon. It would be a strange experience for a country like Iceland, to find itself suddenly brought within speaking distance of the continents of Europe and America. That, however, would be one result of the accomplishment of this enterprise, the cable being planned to land about twenty miles from Reykjavik, to which it would be carried underground. From Iceland it would touch Greenland, and come into connection with all the American lines at Quebec. If ever this line should be carried out, we may hope for an immense improvement in the trustworthiness of our weather forecasts. That fact renders it a matter of much importance to us all.

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We regret exceedingly to learn of the death of Col. E. E. Kendrick, Auditor of the Metropolitan Telegraph and Telephone Company of this city on Tuesday last. Col Kendrick visited his office on Monday apparently in his usual health, but was taken down with apoplexy on Tuesday, and died early in the evening. His loss will be greatly deplored by those who knew him and by all who were associated with him in business. He was very frank and hearty in his manner and address, and greatly esteemed for his manly qualities.

The Dolbear Telephone Company has just been organized in Boston, the president being Henry B. Metcalf, the treasurer F. M. Holmes, and the board of directors as follows: E. B. Phillips, Augustus P. Martin, John C. Paige, William A. Haskell, Eustace C. Fitz, Charles Marsh, J. Otis Wetherbee, Henry B. Metcalf, and Francis M. Holmes.

It is said that this company is the owner of all the patents of Professor Dolbear; but this is not strictly true, since several of the early patents of that gentleman are, by purchase, the property of the Gold and Stock Telegraph Company, we believe.

What the intentions of this company are, have not as yet been stated.

The telephone of Professor Dolbear consists of two metal diaphragms mounted near to, but not touching, one another in a hard rubber case. One of these plates is charged with electricity of high potential, from a distant point, and vibrates in front of the other, thus producing audible articulations, corresponding to the vibrations of the distant transmitting diaphragm; the transmitter being of the ordinary contact varying type, operated with an induction coil in the usual manner.

The financial agent of the new company, S. D. Loring, of 51 State street, Boston, is circulating a pamphlet which sets forth the advantages of the Dolbear telephone in the Professor's own words, the first part being a description of the instrument and its manner of working, and the second a copy of his lecture of March 23, 1882, before the London Society of Telegraph Engineers and Electricians, the rear being brought up by a series of extracts from different journals, and statements from various electrical experts commending the new telephone and extolling its novelty and utility in strong terms.

A morning paper speaks of the loss of the City of Brussels off Liverpool as "one of those catastrophes from which science can invent no safeguard." Was it such a catastrophe? Is science impotent to provide a safeguard for ships in a fog? We do not believe it. The ships of the Inman line are so well equipped that they are no more exposed to such disasters as that which sent the City of Brussels to the bottom of the Channel than the ships of other lines, but we believe that science can provide means to prevent collisions in a fog. When the Arizona crashed into an iceberg during a fog off the banks of Newfoundland, nearly two years ago, we suggested that every passenger steamship should be equipped with an electric headlight, for use in fogs. Every dangerous coast, as well as every ocean steamship, should have an electric light. The intense rays of that light will penetrate the densest fog sufficiently to prevent a ship from crashing against the rocks or another vessel.

Among the latest electrical companies organized we find the names of the Southern Electric Storage Company, the New York Electric Lines Company, and the Exchange Telegraph Company.

The American Bell Telephone Company pays a quarterly dividend of three per cent., January 15th, for the quarter ending December 31st, 1882.

Mr. Walter L. Prentice, formerly of the Associated Press, in this city, but more recently with the Western Union at Pittsburgh, has accepted a position with the Mutual Union Company in New York, and will devote himself to introducing the Phillips' System of steno-telegraphy on the lines of that company. Operators desiring to learn the system should address either Mr. Prentice or Mr. Phillips on the subject, enclosing a three-cent stamp. The latter's address is corner Fifteenth and F streets, Washington, D. C.

The International Exhibition at Amstersdam, which is to be held this year, promises to be a very considerable affair. Holland has awakened from the lethargy with which the project was first regarded, and great preparations are being already made for the reception of the many thousands of expected visitors. A thousand Dutch firms have already entered their names as exhibitors, and demand 8,000 square yards of space. Belgium surpasses this figure. Germany is sending a large number of exhibits, including those of the house of Krupp, England is said to be fairly represented.

The influence of the electric light on health was lately discussed at a meeting of the Hygienic Society of Hamburg, and Dr. Kruss explained his views on the subject at some length. He referred to the influence of the electric light on the human eyesight, and expressed his opinion that it produces no evil effects, the light having a violet tinge under most circumstances. He referred to the somewhat exaggerated expectations which had been formed as to the distance at which the light was visible at sea; but, on the whole, he considered that the safety of human life at sea had been increased by the use of the electric light in lighthouses. The electric light being free from the disadvantages incidental to the combustion of gas in the consumption of oxygen and the production of carbonic acid, he considered its development as being a hygienic measure of importance.

"The enterprising firm of Delano & Haines, formerly of 55 Broadway, have removed to new and elegant quarters in Temple Court, No. 5 Beekman street, where they occupy as fine a suite of offices as can be found in the city, and where, as at their old place, they will be glad to see their friends and the public generally. Messrs Delano & Haines have in a short time taken a stand in the front rank among the promoters of the country, and any one who has an invention or scheme with real merit in it cannot do better than to call on these gentlemen. All are sure to receive polite and respectful attention."

Of 1,785 fires in New York City, in 1881, those charged to electricity were precisely four! It may be interesting to know that 127 were caused by kerosene lamps, 33 from explosions of gas; so it will be seen that electricity has less to account for than its traducers would lead us to believe. All danger may be avoided, and that with no great expense or outlay in placing wires and lamps.

We wish to thank Mr. Geo. L. Wiley, vice-President of the Mexican Telephone Company, for a very elegant picture received from Guadalajara, and also for his very interesting letter No. 3.

The Southern Telegraph Company now has its offices open at Washington, D. C., Alexandria, Fredericksburg, Richmond, Norfolk and Petersburg, Va., and expects to reach Savannah by the 1st of April. The lines are finely constructed and are well filled with business.

Our Mexican Letter.

No. 3.

GUADALAJARA, STATE OF JALISCO, }
E. U. MEXICO, Dec. 5, 1882. }

GEORGE WORTHINGTON, ESQ., *Proprietor and Publisher of the Review, N. Y. City.*

Dear Sir,—If the sage who said, "Oh, that mine enemy would write a book!" had ever traveled by "diligencia," day and night," from Leon to Lagos and Guadalajara, he would have said instead, "Oh, that mine enemy might ride by 'diligencia,' and oh, that it might break down with him three times in three days and nights" (as it did with me on my last trip to this city).

The roads are so bad here that, when the diligence coach runs a little smoother than usual, some one always suggests that "she must be off the track." These people—lineal descendants from the greatest road-builders in the world, the old Romans—have not to-day, after three hundred years' occupation, one good road in the country, except those naturally good and the railroads. These latter are extending in every direction and very rapidly; and, of course, a line of telegraph always advances with them. In the northern States of Sonora, Chihuahua, and Nuevo Leon the work is being pushed. The road from the Gulf of Mexico to the Pacific progresses rapidly from Tampico toward San Luis Potosi and Zacatecas, and large parties of engineers—chiefly Americans—are hard at work between San Blas, on the Pacific, and Guadalajara. The Mexican Central road was opened November 23d to Guanajuato, with bonfires and illuminations, and construction trains are running to Lagos, twelve leagues beyond Leon. In the vicinity of the City of Mexico and south toward Oaxaca the same activity is shown. I have a batch of railroad statistics before me now, but shall not inflict them upon you till you ask for them. "What, nev— ?"

The telephone company in this city, controlling also the whole State (Jalisco), has taken a new start, and it is impossible to keep up with the orders. Every subscriber wants his telephone right now, and the greatest trouble is to explain to Señor X. why Señor Q.'s telephone was connected before his. Four sections of Utica fire-alarm switch are used, Western Electric pole changer, Davis & Watts and Williams' magnetos, No. 14 steel wire, and the American Bell Telephone Company's transmitters and receivers. The latter are leased of the Mexican Telephone Company, which bears a similar relation to the sub-companies in this country to that borne by the American Bell Company to the local companies in the United States.

The Government here—State and municipal—is much interested, and has taken lines to each of the eight garitas (suburban custom house stations), to nine police stations, soldiers' quarters, mayor's office, governor's palace, etc.—twenty-nine Government stations in all. This city (population, 114,000) will be located on both the railroads—the Mexican Central and Mexican National.

Ten leagues from Guadalajara is the City of Tequila, celebrated for the tequila made there in its thirty distilleries. This drink, the Mexican substitute for whiskey, and tasting much like it—*I am told*—is a distillation from the blue maguey—a variety of the same plant from which the national drink, pulque, is made. In the distance, and particularly in a high wind, a field of blue maguey looks almost enough like the ocean to make a sailor happy and a landsman sea-sick.

We are preparing to talk on Sunday next (the only day on which we can obtain the telegraph line) from Guadalajara to Zacatecas, in the Central Telephone Company's territory, and three hundred miles distant, and, after the many former successes in long-line work, have no fear of failure.

At this season the earth and the poles and fixtures are very dry, almost anything would answer for an insulator, and leakage is hardly an element in our calculations. In Guanajuato, in October, when a large invoice of insulators went astray, we built without insulators for fifteen days, laying the wires temporarily on the roofs, or fastening them to nails driven in the roof. They worked perfectly. The stone roofs of the stone houses, standing on very dry ground, make good insulators, and it is necessary at times to seek wide and deep for a ground wire.

A friend in New York asks me why the long lines here in Mexico are so free from interference by induction and earth currents. Because the interfering lines are so few and earth currents so light.

Also, in answer to an inquiry: The next two Exchanges, in point of numbers, after the City of Mexico, were, on November 10th, San Luis Potosi, with 76 subscribers, and Guanajuato, with 71, not including private lines. After these, Zacatecas, Puebla, Mazatlan, Leon, Chihuahua, Guadalajara, and Vera Cruz will probably follow.

The Vera Cruz Company controls the State, and operates an exchange at Orizafa, as well as at Vera Cruz.

In all districts the work progresses, an additional impetus being given by the recent visit of Mr. John D Haines, of New York, Secretary and Treasurer of the Mexican Telephone Company.

The average rates in the Central Telephone Co.'s district are higher than in any other territory, but the general rate prevails of five dollars per month for lines of one kilometer or less. The Zacatecas rate of seven dollars and a half per month is the highest. In many districts, the mining districts in particular, the lines average—on account of greater length—much more than a single rate.

When projected trunk lines, some already begun, are completed between certain of the cities, business will progress even more rapidly than now, as has been shown at Guanajuato and Silao. A trunk line projected or already building between Mexico and Puebla, with branches to several haciendas, will be very valuable; so also will the trunk line between Zacatecas and Guadaloupe.

In the City of Mexico, General Manager D. S. Haines, is pushing the work with more than six hundred subscribers, and has recently completed a new pole line with three private line wires to Tlalpan, fifteen miles away. The removal of the Exchange to the new office, Calle de Tacuba Num. 2, was completed early in October, and the general business-like appearance of the roof fixtures, cupola and operating room, attracts attention.

When one of Professor Elisha Gray's children was born, the news was announced to Dr. S. S. White,—now dead— as an invention by Prof. Gray of a loud-speaking telephone, and I have heard that that excellent gentleman and keen business man immediately telegraphed to Prof. Gray an offer to buy it. A "loud-speaking telephone" invented by General-Manager D. S. Haines, recently appeared in the City of Mexico, and is in every way a success. It is not for sale.

One of the handsomest Exchanges in the Republic and one of the most successful, is that in the City of Puebla, under the management of Mr. W. E. Huntington, well known in your city.

A bright and active telephonist is Mr. L. E. Allen, Director General of the "Compañia del Teléfono del Pacifico," who operates the exchanges at Mazatlan, Colima, San Blas, and elsewhere on the Pacific. The writer recently had the pleasure of meeting Mr. Allen in this city and listening to glowing accounts of the business on the Pacific shore.

The only opposition in the country to the Mexican Telephone Co., has now permanently retired from the field.

Telegraphs here controlled by private persons or corporations are profitably worked. The Government telegraphs are not only not self-supporting, but on the contrary, from causes out of the control of the active managers, are a source of very considerable expense to the Government Many cities have no telegraphs, but lines are being extended with much energy. The chief of the general office in the City of Mexico is Señor Christobal Ortiz. This gentleman is one of the "old-timers," having first entered the Government telegraph service in 1851, and he knows the routes of the Government wires as other men know the city streets. His telegraph maps—made with his own hands—have become standard works. Señor Ortiz has many acquaintances among prominent telegraph men in the States

Between Mexico City and Matamoras, 250 leagues, there is but one wire, with thirty-one offices From Mexico to Guadajalara, 158 leagues, one wire with thirty-eight offices. To Guadalajara there is one automatic repeater and one retransmission, and to Matamoras one repeater and two retransmissions. The quantity of free business on Government lines is enormous. There is no night work; offices open at 8 A.M. and close at 6 P.M.

The Gulf cable from Galveston *via* Tampico, ends at Vera Cruz, but land lines are built from Vera Cruz to Coatzaquelcas thence across the isthmus of Tehuantepec to Salina Cruz. From that point south to La Libertad, San Juan del Sur, Panama and along the west coast of South America to St. Helena, Callao, Iquique, Coquimbo and ending at Valparaiso. A new cable has been laid by the Guttapercha, Rubber and Telegraph Co., of Silvertown, England, for the Central and South American Telegraph Co. It was transferred to the latter company, connected and working in October last. Mr. Jas. A. Scrymser, of New York, is President of this company and also of the connecting Mexican Telegraph Co., whose lines extend from Mexico to Vera Cruz (363 miles).

The writer had the pleasure of meeting in Mexico, General Manager Mayo, of this company, Supt. Van Valkenburgh, Chief of the Vera Cruz office and Manager Sanborn, chief of the Mexico City office, and found them three courteous gentleman and skillful telegraph managers. Mr. Van Valkenburgh has placed many Americans under obligations to him for his courtesies and aid on their arrival at Vera Cruz.

Am glad to hear from your issue of November 15th, and from other sources, that the Metropolitan Telephone Company is so thriving and prosperous under the management of that able and experienced telephonist, Mr. W. H. Eckert. Nothing less could have been expected by those who knew him.

The headquarters of the Central Telephone Company, of Mexico, will be hereafter at Leon, instead of Guanajuato; and, as there is now an Alexandre line steamer every week, letters should be sent by steamer, instead of *via* Laredo.

I sent you a few days ago a copy of each of six newspapers published in this city, including *El Telefono*; also play bills of the Italian Opera Company, the Spanish Opera Company, the theater, the circus, and the company of bull fighters, which now entertain us in Guadalajara. Add to these two social clubs, music on the Plaza every second night, a circulating library, a gallery of paintings, and last, but not least, concerts by telephone, and you will see that the good people of this city may easily find means to employ their evenings. Like all Mexican cities, Guadalajara contains churches by the score.

Let me close with two examples of marked success in this country, viz.: "Look at me," said an American tramp in Mexico, "when I came here I had hardly a rag to my back, and now—I'm full of rags;" and the Irish tramp answered, "When I came here I had nothing; an' faith I've got it yet."

But all this was before the days of the railroad and the telephone.

I wish you and your readers, and the telegraph and telephone fraternity in general and in particular, a very "Merrie Christmas" and a most happy and prosperous New Year.

I am, your friend, G. L. W.

Guadalajara, Jalisco, E. U. Mexico, Dec, 5, 1882.

We are happy to be able to give to many of our inquiring readers the following information concerning electrical engineering, as the supposition has been that there was no college in this country where it was taught. Those contemplating a course of this kind cannot do better than to correspond with Prof. Cross, of the Massachusetts Institute of Technology, who is recognized as one of the ablest electricians in this country. We append a letter just received:

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
BOSTON.

To the Editor of the Telegraph and Telephone Review.

MY DEAR SIR,—My attention has been called to a statement in the last number of your journal, to the effect that there is no opportunity for a student to train himself in electrical engineering in this country, the four schools which you mention being all in foreign countries.

From the inclosed pamphlet, and from the catalogue which I send you in same mail with this, you will see that the Institute has established a course to meet the want in question. I think that the course laid out is at least as thorough and extended as that of the foreign schools. I will only add further, that we have six students in this course who are all candidates for a degree.

May I ask if you will send a copy of your journal to the Department of Physics, at the Institute, in my care, and on receipt of bill I will forward amount of subscription for the coming year.

Yours, very truly,

CHARLES R. CROSS.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

BOSTON, August 31, 1882.

In view of the rapidly increasing development of the various branches of electrical engineering, and the consequent demand for persons conversant with the theory and applications of electricity, the corporation of the Institute of Technology has established a course of instruction bearing more directly upon this subject than any of those which have hitherto been offered to the student. This has been done by establishing an alternative course in physics, to be known as Course VIII., B, which will differ from the present Course VIII. chiefly in the continued study of electricity, instead of the pursuit of other branches of physics, and in the introduction of a considerable amount of practice in the laboratory of mechanical engineering and the workshops, in place of chemical analysis.

An endeavor will be made to give to students pursuing this course a knowledge of the theory of electricity sufficiently extensive to prepare them for all ordinary electrical work, and which shall also serve as a foundation for more advanced study. They will receive instruction in the physical laboratory in the various methods of electrical testing. Special instruction regarding land and submarine telegraphy, the telephone, electric lighting, and the electrical transmission of power will be given, and the study of acoustics will also be required in view of the art of telephony.

The nature of the course is evidently such that facility in the acquisition of both mathematics and physics is essential to pursuing it successfully.

THE ANTHRACITE PRODUCT OF PENNSYLVANIA.—The past year's output of the anthracite coal mines of Pennsylvania was the largest on record. It was, in round numbers, 29,500,000 tons, or nearly 1,000,000 tons more than in 1881.

Telephonic Amenities.

We all know that when telephony was young, it was customary to work up the public curiosity by means of telephonic concerts, in which the audience were usually seated comfortably in some spacious audience room in one city, and the performers wore their young lives in sorrow away in another; the connecting touch of nature which made the two parties kin, being represented by the lecturer and his apparatus, plus a telegraph wire and a set of Morse instruments which were to be used in case the telephones were to be seized with pleuro-pneumonia or epizootic.

There was naturally a quasi-attractive air of mystery pervading those somewhat lugubrious entertainments; and this would be materially deepened after an unsuccessful and disappointing seancé, by the incredulous and withering tone of the next morning paper, which, after a few sarcastic remarks on the distant and "suppositious Mr. Watson," implying like Betsy Prig, that it "didn't believe there was no such person," would depreciatingly comment on the lecturer's ventriloquial ability; and cynically quote in relation to the few sounds of Mason and Hamlin music that were heard, a few lines from the Arcadian idyl of "Johnny Morgan played the organ," intimating that Johnny, instead of being fourteen or fifteen miles away, was only just behind the curtain.

Still, to do the gentlemen of the press justice, they were equally ready to commend and applaud, when the performances were successful.

And when we of the inner brotherhood, cast our remembrances a few years back, and reflect upon the particularly diaphanous character of a large majority of such performances, we cannot but wonder at the exemplary patience of the general public, for even the most successful performance, aside of the wonder attaching to the reproduction of words uttered at a distance, was of the direst nature; and the music as it reached our ears was wire-drawn in the extreme, and resembled nothing so much as the interior of a boiled orange, or the utter depravity of taste concentrated in the pulp of an unripe persimmon.

But when I started out I had no intention of moralizing at such length. The foregoing reminiscences were suggested by the fact that on the evening of Sunday, the 7th inst., for the first time for many months, my ears were saluted by the dulcet sounds of music furnished from a distance.

As some of our readers know, and as more do not, Brockton is a rising city of Massachusetts, about 20 miles from Boston, and its telephonic interests are presided over by W. J. Jenks, a gentleman who is indefatigable in his telephonic and physical studies and experiments.

Malden is the name of another suburban city, about 5 miles on the other side of Boston, and the music we have spoken of was performed at Brockton and listened to at Malden.

It consisted of well selected and brilliantly performed banjo solos, the operator being a friend of Mr. Jenks, and the airs played, were we presume, considering the day, of a sacred character, although our ears failed to detect that flavor. The music was so perfectly distinct, so beautifully clear, and so very naturally sounding, being in this respect a complete antithesis of the more ancient efforts which have been referred to, that it appeared to the writer to be worthy of notice in the columns of the REVIEW; and from the success that attends Brother Jenks, it is natural to suppose that if in any of our smaller cities the telephonic interest should ever flag, it may be revived by a little concert, which transmitted and reproduced by the improved instruments, which we now have, will be an entertainment if rightly managed, which we shall not need to point at with the finger of scorn.

The expense attending the use of the Fuller Electrical Co.'s apparatus, aside from the first cost of the plant, is confined to the cost of the power required to run the generators, of which a safe outside estimate is one horse-power per light—to the cost of carbons consumed, which is about 1½ cents per hour, and to the cost of attendance, which is only that of a boy or man for a few minutes each day to properly clean the lamps and to put in new carbons ready for "lighting up" time; the care of the generator will add little to the duties of the engineer in charge of the power employed, it being only necessary to see that the brushes are properly set and the oil-cups filled.

Mr. S. D. Mott, electrical expert (formerly connected with the Edison Co.), has opened an office at 21 Park Row for the purpose of procuring patents, negotiating electrical patents and making drawings, &c. Mr. Mott is experienced in that field and deserves success.

Mr. Edison said to a reporter in Boston last week: "The largest undertaking we have on hand now is to carry 15,000 horse-power of electricity eighteen miles into the City of Mexico, for the purpose of lighting that city and furnishing power for various purposes. We are only making estimates as yet. This thing of carrying power from waterfalls to a considerable distance is going to be done very extensively in the future. It is practicable to carry 25,000 horse-power twenty miles if necessary."

The Edison Light in Newspaper Offices.

The following extract is from a letter written by W. A. Croffutt, to the *Detroit Post:*

"A year ago there was a dozen companies ready to promise to furnish any city with the incandescent lights—that is, to light interiors with small shining bulbs like gas jets—but at this moment Edison's company is the only one actively in the field. It not only occupies the field, but it comes near filling it. Mr. Edison has done all he ever promised to do (if the present results are permanent), but he has not done it as quickly as he anticipated. The first district of this city is lighted—lighted apparently to the satisfaction of all hands.

"The *Times* is lighted on the circuit of the first district. I went into the counting-room and editorial-room last night to inquire about it. They spoke warmly in its praise. 'The best artificial light I ever wrote by,' said the manager.

"Eighty-one buildings are now using the electric light exclusively, and more are being added every day. Only one engine is being used at present, and it delivers all the light that was ever promised and more. The loss from resistance is estimated at 5 per cent., but the loss from induction or leakage is only 1,000th of 1 per cent. Mr. Johnston tells me—which implies pretty nearly perfection. The light actually furnished is about nine lamps to the horse power. The six engines in the Pearl street station were found not to run uniformly, and are being supplied with new governors. Next week, Monday, they will all be started together, and 400 buildings will be lighted in addition to those at present on the circuit. The next district to be lighted will be the heaviest in the city—that of which Madison Square is the center.

"The *Herald* and *Telegram* establishment is lighted wholly by the same light. I walked over there after completing the above paragraph and saw the editor, Mr. Connery, and the business manager, the foreman, and several of the editorial writers and reporters. 'We feel now,' said the foreman, 'as if we could never again get along without it. It furnishes such a clear, steady, light, and the temperature of the composing-room, generally too high, is very much

reduced. We shall never go back to gas. As to the cost, I don't know. If it is more than gas, I think our men would be willing to pay the difference, but they say it is cheaper than gas.' The room is about a hundred feet square, and everywhere the little bulbs are bent down over the thick set cases, each surmounted with a large tin shade.

"The testimony of the business manager was to the same effect, but he added: 'It is not only better than gas but cheaper. Being outside of the first district, the *Herald* is lighted from an isolated plant—that is, we furnish our own electricity. We have two engines. The total cost—engines, engineers, dynamos, royalty, interest on investment, and all—amounts to about $7,000 a year. Our gas bill for several years have been $12,000 a year.'

"The Edison Isolated Company, besides the *Herald* Building, has already lighted about 140 buildings—mostly manufactories—throughout the country. These include the Philadelphia *Ledger*, *Ohio State Journal*, Davenport *Gazette*, Philadelphia *Public Record*, Baltimore *Sun*, and Boston *Herald*.

"Said Ralph Meeker, of the *Herald*, to-day: 'It is as much better than gas as gas is better than tallow candles.'"

"The Mexican Telephone Company has moved its quarters from 55 Broadway to Temple Court, No. 5 Beekman street, where they now occupy large and elegant offices."

"The Tropical American Telephone Company Limited, which is assuming large proportions, and fast becoming an important Telephone corporation, has left its old quarters at 55 Broadway, and moved to new and commodious ones in Temple Court, No. 5 Beekman street."

The Bell Telephone Company.

The Bell Telephone Company of Canada now has exchanges or agencies in nearly 100 cities or towns in Canada, has some 4,250 subscribers, and gives employment to about 250 people. The company, at its factory in Montreal, manufactures all the instruments which are used in Canada.

Montreal has about		866	subscribers.
Toronto	"	525	"
Hamilton	"	320	"
Ottawa	"	250	"
St. John, N. B.	"	275	"
Winnipeg	"	250	"
Quebec	"	240	"
London	"	230	"
Halifax	"	170	"
Victoria, C. B.	"	130	"

The company is about opening exchanges at Brandon, Emerson and West Lynne, Manitoba; Stratford, Galt, St. Catherines and St. Mary's, in Ontario; and Three Rivers, in Quebec. The company owns a cable connecting Windsor with Detroit, giving communication with the extensive system of the Michigan Telephone Company, and has just laid another cable between Quebec and Levis. It has also built a line connecting Cobourg with Guelph, through Port Hope, Newcastle, Bowmanville, Oshawa, Whitby, Toronto, Springfield, Palermo, Waterdown, Hamilton, Dundas, Galt and Hespeler, giving the subscribers in these places a connection with their neighboring towns. This line will now be extended through Brantford, Paris, Woodstock and Ingersoll to London, which is already connected with St. Thomas. These lines do not interfere with the telegraph companies, nor reduce their receipts, because they are used for personal communication only, and in cases in which the parties would not use the telegraph. About 1,000 miles of telephone lines were constructed in Canada in 1882.

Oriental Telephone Company (Limited).

7 COUNCIL-HOUSE STREET,
CALCUTTA (East India), 28th November, 1882.

Editor of the Review of the Telegraph and Telephone, New York.

SIR,—Perhaps it will interest you to know the following:

The Oriental Telephone Company Ld.'s Exchange here has now one hundred and five subscribers working well, and some private lines. This number is daily increasing; and, now that the native merchants are beginning to adopt it, the exchange promises at no very distant period to be in a very flourishing condition.

The Law system is used in the exchange, and the Gilliland magneto for the private lines.

The wires, No. 12 iron, are for the most part run on poles (iron). Wires are run and left permanently at all the wharves, and the ships and steamers are connected as they come in. This is, I believe, a novelty in telephony; at any rate, it is received and supported very well here. The charge for three weeks is about $9.

I am, sir, yours, &c. "BENGALI."

The London and Globe Telephone Company vs. The United Telephone Company—London.

It will probably be remembered that some time ago we gave the result of the trial in England, in which an action was brought against Messrs. Harrison, Cox, Walker & Co., of Darlington, by the United Telephone Company, who own the Bell and Edison patents, for infringement of the same. The judge (Mr. Justice Fry) held that the Edison transmitter patent was void, and that the Bell patent was not invalidated by the prior publication by Sir William Thomson of the details of construction of the Bell receiver and the exhibition of the instrument itself.

This decision the United Telephone Company appealed against and at the same time they disclaimed before the attorney-general that part of the Edison transmitter patent which rendered it invalid.

The defendants appealed against that part of the case relating to the Bell patent.

On the 22d of December, the day fixed for confirming, in legal form, their intention to prosecute the appeal, they withdrew their notice, thereby acknowledging the judgment of Mr. Justice Fry.

The appeal against that part of the judgment relating to the Bell patent is set down for an early date.

This action against Messrs. Harrison, Cox, Walker & Co., it may not be generally known, was defended by the London and Globe Telephone Company, who bore the heavy expense of the trial, which could not have been carried on by men of such limited means as the defendants.

The opposition fight between the two companies has been commenced, the "Globe" company having recently received its license from the Postmaster-General to transact a telephone business, and being now engaged in actively prosecuting its work by laying down cables (which will all be underground) and constructing lines, and they have every confidence in their ultimate success.

The Telephone in the River Plate, South America.

Arrangements having been made for the fusion of the interests on the River Plate of the Continental Telephone Company, of Boston, U. S., the purchaser of the rights, patents, and property of the Rio de la Plata Telephone Company, Limited, and of the National Pan Telephone Company of Buenos Ayres, we take this means of calling the attention of those interested to the opinions of the Buenos Ayres Press upon this union herewith enclosed.

The new company will, immediately upon its incorporation, possess the most extensive system of Central Offices, house-top and pole lines in South America, and will own the patents and rights for the Argentine Republic and Uruguay of the Telephone known as the Bell (not the Gower-Bell), including the Blake transmitter, the instrument adopted by the United Telephone Company of England for its exchanges, including those of London, the one in use generally throughout Europe, and exclusively in the United States.

Aside from the existing offices and lines now in operation with 700 subscribers, it immediately comes into possession, free from indebtedness or obligation, of over 1,200 Bell instruments of the last improved pattern, and immense quantities of other stores.

Purchases on account of the new Company have already been made of cable and other devices of latest invention for the improvement of telephone service, and 500 additional Bell telephones have been ordered, making altogether the most complete equipment of any company doing business in South America.

F. W. JONES,
For the Continental Telephone Company.
AD. FELS,
For the National Pan Telephone Company.

Astonishing Growth of the Paterson Telephone System.

At the date of the consolidation of the Paterson telephone system, the Edison (started by Mr. Noonan), the Bell, and the "Gold and Stock," something upwards of two years ago, there were 360 poles and twelve miles of line, connecting one hundred subscribers. There are now 1,880 poles, an addition of 1,520, and 60 miles of line connecting 540 subscribers, an average gain of twenty-five per month. Paterson is said to have the best and most economically constructed exchange in the whole country. All wires have been removed from house-tops and strung on poles in regular order, so that no straggling wires are seen either in the city or in the suburbs. The trunk lines to Passaic City and Hackensack are greatly used, and a new exchange will shortly be opened at Ridgewood. Paterson can now talk—for a very low toll—to almost all towns and cities of any consequence in the State through the great trunk line system of the New Jersey Company, which is being extended very rapidly. Mr. Noonan is preparing to connect the pole lines of the Passaic City and Hackensack trunk lines and is contemplating an extension of the Hackensack line to Hoboken, for a new direct trunk line from Paterson to New York, which will do away with one cable and reduce the talking distance some miles. The new line to Stanhope, referred to recently, was commenced Wednesday, with a heavy force of men. Mr. Noonan is certainly the most enterprising of managers, as well as a capable business man and an accomplished electrician, and Paterson has in him a marked illustration of the right man in the right place. He is the pioneer telephonist of this section, having constructed and operated a private telephone line between the factories in Passaic City and New York, a distance of twelve miles long, before any public system had been thought of here. This was one of the very first long-distance telephone lines in the country.

In this connection it may be of interest to our readers to know to what extent the "speaking wire" is used in other cities and other sections of the country. There is, we are convinced, a general lack of information on this subject, for even the great inventor, Edison, when asked recently to what extent the telephone was used, could not even guess, and complete statistics are unobtainable. A recent compiler of statistics has published a table from which we extract the following which is sufficient

for purposes of comparison, although the value of the figures is brought into question at the very outset by the conspicuous absence of Paterson, in the enumeration, while towns and cities of less note and using not half as many instruments are listed. We give it, however, for what it is worth, the figures representing the number of instruments in use: New York, Brooklyn and Hoboken have 4,000; Albany, 1,039; Buffalo, 958; Troy, 727; Rochester, 534; Saratoga, 149; Schenectady, 112; Cohoes, 96; Amstersdam, 86; Gloversville, 81; Batavia 50 and Ballston 41. Chicago has 2,726, and Bloomington, in the same State, has 200. Cincinnati has 1,794; Cleveland, 855; Columbus, 584; Toledo, 461; Dayton, 420; Portsmouth; 111, and several other towns in Ohio are supplied with from 50 to 75 each. Boston has 1,325; Lowell, 716; Worcester, 680; Pittsfield, 195; North Adams, 746; Fitchburg, 160; Northampton, 132; New London, 168, and Westfield, 88. San Francisco has 1,299, and Philadelphia has 1,253. Providence has 979 instruments; Pawtucket, 154; Woonsocket, 89; North Attleboro', 52; Bristol, 41 and Attleboro', 30. Louisville, Ky., has 962 and Frankfort, 29; Baltimore has 918; St. Louis, 900; Denver, Colorado, has 855; Leadville, 234 and Brockton, 129; Lowell, Mass., has 854; Manchester, 316, and Fitchburg, 235; New Orleans has 810; Milwaukee, 755; New Haven, Conn., 662; Hartford, 553; Washington, D. C., 570; Omaha, 517; Minneapolis, 482; St. Paul, 342; Burlington, Iowa, 298; Clinton, 210; Norfolk, 169; Kansas City, 282; Marshalltown, 105 and Atchison, 100; Richmond, Va., 249; Evansville, Ind., 238; Charleston, S. C., 237; Little Rock, Ark, 213; Savannah, Ga., 207. Muskegon, Mich, 159; Atalanta, Ga., 132; Nashville, Tenn., 128; Madison, Wis., 109. There are in Mexico 300.

It is estimated that there are in the United States, 37,187 of these annihilators of distance, and in Great Britain 4,946, of which 1,561 are in London, little more than half the number in Chicago. Manchester has 692, only 30 more than New Haven, Conn.; Liverpool, 681; Sunderland, 155; Bradford, 129; Birmingham, 101 and Leeds, 79; Blackburn, 52, and half a dozen other important towns numbers varying from 30 to 42. Dublin has 193; Belfast, 180, and Glasgow, 600. France is next in numbers, having 3,640, of which about 2,422 belong to Paris—that is, about 300 less than Chicago. Bordeaux has 215; Havre, 163, Lyons, 346; Marseilles, 233; Lille, 114; Nantes, 99 and Rouen, 48. Italy has 2.902 instruments, Rome having 472; Germany has 2,322, 943 being in Berlin. The Austrian Empire has 980, just one more than Providence, R. I., and a dozen more than Louisville, Ky. Denmark has 398; Russia, 238; Holland, 851; Sweden, 672; Switzerland, 621; Egypt, 183; British India, 213.

More About the Telephone.

A young man in one of the outlying districts took an unwarranted liberty with the telephone the other day. A big bumble-bee came bumbling into the office through the window, which was open, and was caught and placed in a tumbler by the young man, and the tumbler placed over the orifice of the transmitter. He then rung up the central office, and, with the telephone to his ear, awaited the result. "Hello!" came in response from the other end of the line. "Bum, bum, burr-r," buzzed the bee in return. "What's that?" "Bum, boom, buzz, whir-r-r," "I can't quite understand. You'll have to repeat that." "Bum, buzz, whir-r-r," went the bumble-bee. "Oh, talk United States, you bloody imbecile! Didn't you ever use a telephone before, you idiot?" yelled the enraged operator. A renewed and more frantic buzzing was the only response. "Go to thunder, you bull-headed old fool!" came sizzling over the wire. No response. "Something's the matter with your blasted old box. I'll send a man around to-morrow to fix it," came from the central office man, and then a "click," as he hung the instrument back on the hook.—*Exchange.*

European Telegraph Statistics.

According to statistics recently issued by the European International Bureau of Telegraphic Statistics at Berne, the total length of telegraph lines there at the present time is: Russia 50,090 miles; Germany, 44,265 miles; France, 43'650 miles; Austria-Hungary, 31,015 miles; Great Britian, 26,465 miles; Italy, 16,430 miles; Sweden and Norway 12,625 miles; Switzerland, 4,697 miles; and Belgium, 3,505. The length of wires in the various countries is as follows: Germany, 159,910 miles; Russia, 134,465 miles; France, 125,265 miles; Great Britian, 121,720 miles; Austria-Hungary, 89,960 miles; Italy, 53,692 miles; Sweden, and Norway, 28,445 miles; Belgium, 16,345 miles; and Switzerland, 10,010 miles. The total number of messages sent during the past year are classed as follows: England 29,820,445; France, 19,882,628; Germany, 16,312,457; Austria-Hungary, 8,729,321; Russia, 7,298,422; Italy, 6,511,497; Holland, 3,109,230; and Sweden and Norway, 2,028,805.

London is to have another marine and mechanical exhibition in July, 1883. It is intended that it shall represent almost every department of engineering. Not only is it to be largely devoted to marine work, but mining, casting, forging and rolling, hydraulic and pneumatic work, workshop tools and appliances, the treatment of raw production, general machinery, gas, water, electric and telegraph engineering, are all to be represented. Exhibits will be received at the building on Barford street from June 28 till July 4. The exhibition opens on the 5th and will be closed on the 21st, and goods must be removed by the 26th. All communications should be addressed to S. Barnett, 4 Westminster Chambers, London, S. W., England.

The Gold Coin in the World.

The Paris Bourse estimates the total stock of gold in the world in use as coin, or as banking reserves in one shape or other, at about $2,818,800,000, of which total England his $612,360,000; France, 660,960,000; Germany, $388,800,000, and the United States, $447,120,000. Other nations come in for shares varying from $3,888,000 in the case of Holland, to $147,744,000 in Spain.

The Atlanta *Constitution* notes the sale of 400 acres of mining lands in Northern Georgia, to an English company, for a sum amounting to about $5,000,000.

According to a recent statistical estimate, the present population of the province of Buenos Ayres, is computed to be 2,626,000.

Another Electric Light Company.

ALBANY, Dec. 30.—The New York and Brooklyn Electric Light Company, of New York, capital $25,000, was incorporated to-day.

A Dictionary of Electricity, by Henry Greer, N. Y. Agent College of Electrical Engineering, 122 E. 26th street, N. Y. Octavo, $3,00. Professor Weston says of it: "It is exceedingly valuable to all interested in electrical science. Leaving out the old glass machine, sealing wax, amber experiments, etc, etc., and inserting cuts and descriptions of the recent wonderful inventions, makes it exceptionaliy interesting to electricians and telegraphers. Nearly every electrical inventor and manufacturer in the world will find a description of their invention or apparatus in it."

Edison's Factory Lighted in France.

The Société Industrielle et Commerciale Edison have installed a plant for lighting their own works, consisting of one K dynamo and four hundred A and B lamps. This factory is now in full operation turning out dynamo lamps, etc., for installing Edison plants in France and in other parts of Europe. It is located at Ivry-sur-Seine, near Paris.

The Jobbins Manufacturing Company, patentees and manufacturers of dynamo machines, electric motors, electro-plating machines, arc and incandescent lamps, accumulators (or storage cells), water motors for hydrant or stream, secured by new and valid patents, the property of this company. This company was organized in 1880 for the extended development and application of the numerous electrical inventions of Dr. Geo. W. Beardslee, whose varied qualifications in this department of science have been so well known, recognized, and indorsed by the scientific world for nearly a quarter of a century. The "Beardslee Electric Light" was indorsed and recommended by the United States Government as early as 1857, and for some of his inventions in this direction patents were issued in Great Britain and elsewhere as early as 1859 and 1861, specifications being furnished his attorney (the late Chas. M. Keller) for securing the same in the Patent Office of the United States, but the commencement of hostilities between the North and South made such urgent demands upon his patriotism that at once he adopted his advanced electrical knowledge to the arts of war, and with thousands of other self-sacrificing men forgot his own private interests in the welfare of his country. After the close of the war, Dr. Beardslee's long association with military interests led him to seek the introduction of his torpedo systems in Europe, and after extensive experiments, particularly with the Government of Great Britain, he returned home, and again resumed his developments in electric light and power.

The largest empire in the world is that of Great Britain, comprising 8,558,658 square miles, more than a sixth part of the land of the globe, and embracing under its rule nearly a sixth of the population of the world. In territorial extent the United States ranks third, containing 3,580,242 square miles, including Alaska; in population it is fourth in rank, with its 50,000,000 people. Russia ranks second, 8,352,940 square miles.

The popular impression that an editorial room is a constant battle-ground, that the editors are being incessantly hounded for copy, that indignant subscribers rush in with complaints and horsewhips, that the editor is a persecuted creature—is all a fallacy.—*Denver Tribune.* Of course it is. An editorial room is a luxurious place of oriental ease and heavenly bliss. The editors lounge back in their easy chairs, and between sips of champagne, presented by admiring subscribers, dictate to dark-eyed, fair-haired, bewitching amanuensises the words which are to appear in the paper, while polite compositors hover around and receive the copy with grateful smiles. Occasionally the foreman drops in and leaves on the editorial desk a box of fragrant Havanas, but this does not happen often.

The largest trees are the mammoth trees of California. One of a grove in Tulare county, according to measurement made by members of the State Geological Survey, was shown to be 276 feet high, 106 feet in circumference at the base, and 76 feet at a point 12 feet above the ground. Some of the trees are 376 feet high and 34 feet in diameter. Some of the largest that have been felled indicate an age of from 2,000 to 2,500 years.

The report of the Auditing Committee of the Telegraphers' Aid Society, for the quarter ending Dec. 7, shows a surplus of $383.26 in the treasurer's hands. During the quarter $100 has been disbursed for benefits. Receipts for same period were $187; members in good standing, 135.

Mr. W. Kurtz takes great pleasure in announcing that he has removed his down-town branch from the old Post-Office Building, Nassau street, to No. 233 Broadway, between Barclay street and Park Place, opposite the new Post Office, where photographic portraits, law documents, maps, and other objects are taken by electric light.

Mr. Kurtz desires to specially call the attention of the public to the fact that the pictures taken by the electric light are much better than the sun pictures, and that this new departure has many advantages over the old style.

No more going up-stairs—the pictures are taken on the ground floor.

It is not necessary to wait for a clear day. The work of the photographer is of an even excellence, as the electric lamps produce the same amount and the same fine photographic quality all the year round—an enormous advantage over the variations of daylight.

By a patented apparatus the picture can be taken quicker and softer in tone than in daylight. The apparatus is a low platform, adapted to rotate on a central pivot in a socket in the floor—the sitter on one end, the camera at the other end.

This improvement in the art of photography consists in moving the camera and sitter, while fixed relatively to each other through an arc or a circle, during exposure, whereby the shadows are softened, and a more artistic distribution of light and shade is obtained.

OFFICE OF OLIVER WIRE COMPANY (LIMITED).

PITTSBURGH, December 30, 1882.

We take pleasure in informing our friends and customers that we have completed the rebuilding of our wire mill, which was destroyed by fire on the 7th of November last, and will resume operations in all departments on Tuesday morning next, January 2d.

With our new and improved machinery, our capacity will exceed one hundred tons of finished wire per day, and in quality it will be our constant aim to maintain, and, if possible, to excel our former high standard.

Our galvanizing department is greatly enlarged and improved, and in this difficult branch of our business, with the aid of our patented processes and appliances, we confidently claim to surpass all competitors.

Soliciting a continuance of the patronage heretofore so liberally bestowed upon us, we remain

Yours, very truly,

OLIVER WIRE COMPANY (Limited).

"I am an Oxford graduate, a bachelor of arts, doctor of medicine, have no vices, and never indulge in stimulating liquids," said an intellectual-faced young man, as he interviewed the manager for a berth as first walking gentleman. "This business," said the manager sorrowfully, as he lifted a double-barrelled pinch of snuff to his nose, "is demoralizing. I would not care to blast so many virtues by the rude contact with the unreasoning world. You are too good for us, sir—far too good;" and the call boy showed all this aggregation of merit to the door.

Wanted.—An electrician who is a thorough mechanic and practical engineer desires a position as engineer. Unexceptional references given. Address, Alden Bradford, Shoves Mill, No. 2, Fall River, Mass.

A Licensee Cannot Sue for an Infringement.

Judge Wallace, in the case of Ingalls *vs.* Tice, U. S. Circuit Court for this district, has decided that an agreement, whereby the patentee granted to the complainant the sole and exclusive right to sell the patented articles within certain specified territory, was not a transfer of an individual part of the whole patent, or of the exclusive right of the whole patent for a particular territory. It is simply a license, and does not entitle the complainant to bring suit in his own name, the patentee not being a party to the suit.

The Western Union Leasing New Lines.

DETROIT.—It is understood that about 1,400 miles of telegraph lines, chiefly in western and northern Michigan, will pass into the possession of the Western Union Company on Januaey 1st, under a contract by which that company has thereafter the lease of the lines with the option of purchase. They were built and owned by the Michigan Telegraph Company.

Grand reception of the telegraphers of New York Friday evening, February 9, 1883, at Tammany Hall. Tickets (admitting gentleman and ladies), $1, to be had from the committee—Court M. Cunningham, A. J. Voyer, S. E. French, P. J. Kelleher, Geo. St. Clair, J. Mitchell.

A great distrust of electricity exists in the minds of the uninformed, and yet since Franklin first drew it from the clouds, Brewster, Faraday and Morse have proved it to be one of the most docile servants man possesses. We believe, although electricity has only been practically applied within four or five years for purposes of light; that it is less dangerous to life than steam, gas, or the ever deadly and ubiquitous oil-can.

As the electric light is created by the electric current, it is absolutely necessary that there should be positive uniformity in the flow of the current; this cannot be attained unless the speed of the driving motor is constantly uniform, be it water, air or steam. To secure this regular steady motion the motor should be of sufficient power to do the required work easily. Where steam is employed, it is decidedly more economical to have both engine and boiler of abundant capacity so as to maintain regular speed.

The Multiplex Telegraph Company, of New York, was incorporated at Albany on Dec. 15; capital, $1,000,000. The Compound Wire Company, of New York, was incorporated Dec. 14; capital, $100,000.

The Central & South American Telegraph Company gives notice to the public that dispatches for Panama, Lima and Valpariaso will secure prompt and correct transmission if marked "via Galveston."

Oscar Wilde's sojourn in this country was, after all, not entirely unproductive of results. He learned to know himself, as is shown by the question he put to Capt. Williams, whether he had ever seen an ass, and if so, whether he cared to look at the representative of the asinine family before him.

Things one would rather have left unsaid: Hostess—"What, must you go already, Professor?" The Professor—"My dear madam, there is a limit even to my capacity of inflicting myself on my friends!" Hostess—"Oh no, not at all, I assure you!"

Whenever a certain Southern paper speaks of a contemporary it calls it "Exchange," with an upper case E. It's a capital idea

The individual who imagines he could run a paper better than its editor is as numerous as the fellow who believes he can sing divinely.

Whoever doubts that the newspapers have a mission should enter a car and see how useful they are to the men when a fat women with a big basket is looking around for a seat.—*Lowell Citizen.*

The largest ship is the Great Eastern. She is 680 feet long, 83 feet broad, and 60 feet deep, being 22,927 tons burden, 18,915 gross and 13,344 net register. She was built at Millwall on the Thames, and was launched January 31, 1857.

NEW PATENTS—ELECTRICAL—1882.

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING DECEMBER 12TH, 1882.

269,022 Appliance for galvanizing, Henry Cull, Johnstown, Pa.

268,980 Armature for dynamo-electric machines, Foree Bain, Union City, Ind.

269,036 Armature for dynamo-electric machines, Andrew B. Fisher, Union City, Ind.

269,224 Automatic telegraph signal box, Paul Seiler, San Francisco, Cal.

269,130 Automatic telephone exchange, Frank H. Snell, Washington, D. C.

268,850 Carbon holder for electric lamps, Clinton M. Ball, Troy, N. Y.

269,085-6 Conduit for electrical conductors, John K. McLaughlin, Philadelphia, Pa.

269,013 Cut-out for electric lamps, C. T. Coleman and H. A Smith, Atlanta, Ga.

268,956 Dynamo-electric machine, Elmer A. Sperry, Cortland, N. Y.

269,151 Electric arc lamp, Leonidas G. Wooley, Mendon, Mich.

268,850 Electric arc lamp, Clinton M. Ball, Troy, N. Y.

269,132 Electric lamp, William Stanley, Jr., Englewood, N. J.

269,092 Electric locomotive, Eusebius J. Molera, San Francisco, Cal.

269,082 Electric motor for Geissler tubes, Willian J. McCollom, Aurora, Ill.

268,908 Fire-damp indicator, Isidor Kitsee, Cincinnati, Ohio.

269,090 Mechanical telephone, Charles Egan, Zanesville, Ohio.

268,796 Telegraph for railways, William L. Hunt, Port Hope, Ont.

WEEK ENDING DEC. 19, 1882.

269,225 Automatic magneto signal for telephones, William Painter, Baltimore, Md.

269,379 Conduit for electric wires, Bassler Boyer, Lebanon, Pa.

269,417 Electric arc lamp, Alfred G. Holcombe, New York.

269,453 Electric arc lamp, William S. Parker, New York.

269,470 Electric cable, William H. Sawyer, Providence, R. I.

269,328 Electric connecting cord, William H. Sawyer, Providence, R. I.

269,273 Electric fire alarm and extinguisher, Clarence A. Evans, Upland, Pa.

269,331 Electro-magnetic engine, Adolph E. Schreiber, Brooklyn, N. Y.

269,318 Electro-magnetic motor, Charles C. Peck and W. H. Chapman, Middlebury, Vt.

269,179 Galvanic battery, Edward M. Cointepas, Boston, Mass.

269,454 Galvanic battery, Charles D. Parkhurst, Providence, R. I.

269,476 System for utilizing time switches for electric circuits, Eli T. Starr, Philadelphia, Pa.

269,321 Telegraph key, Cyrus Prosch, New York.

269,268 Telephone exchange system and apparatus therefor James O. Shiras and E. A. Eckert, Cincinnati, O.

269,326 Telephone repeater, James S. Rogers, New York.

269,281 Transmission of power by electricity, Zénobe T Gramme, Paris, France.

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Scientific & Mechanical Purposes.

IMPORTED AND FOR SALE BY

The S. S. White Dental Manufact'g Co.,

PHILADELPHIA—Chestnut St., cor 12th.

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Electrical stocks a specialty.

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PURE ELECTRIC COPPER WIRE,

For Magnets, Telephones, Electric Lights, etc.

WITH H. SPLITDORF'S PATENTED LIQUID INSULATION COVERED WITH COTTON OR SILK.

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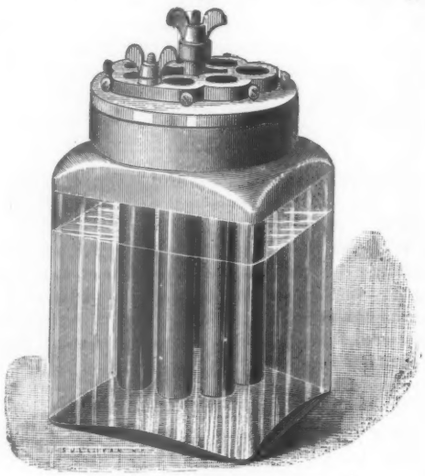
THE "DIAMOND"

Carbon Telephone Battery.



[PATENT APPLIED FOR.]

Jar, 6 inches high, 4 inches square.

FITS ANY TELEPHONE BOX.

HAS MORE THAN

Double the Carbon Surface

OF ANY OTHER BATTERY.

EXCELS FOR

Constancy, Simplicity and Price.

ELEMENTS.

7 Sticks Round Carbon, ⅜ in. diameter, 5½ in. long.
Amalgamated Zinc, ⅜ diam.
Sal ammoniac.

Price Complete, $1.25 per Cell.

Subject to Liberal Discount in Quantities.

[FAC SIMILE OF LABEL, REDUCED IN SIZE.]

THE "DIAMOND" CARBON BATTERY

DIRECTIONS.

1.—Place in the Jar two ounces best Sal Ammoniac, which thoroughly dissolve, filling with water to the shoulder of the jar.
2.—See that the cover fits as nearly air tight as possible and that the rubber on the zinc rests on the top of the glass.
3.—Keep in a dry place if possible, be careful that a good, firm, clean contact is made.

NOTICE!

As every part of The Battery except the glass is made at our own Factories, we warrant the quality, and purchasers may be assured of uniformity and care taken in manufacture.

The Battery has more than double the Carbon surface of any other, unless small parts do get out of connection; it is also easily and cheaply renewed.

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THE ELECTRICAL SUPPLY CO.

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Factory at Ansonia, Conn.

Electric Light Apparatus

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ELECTRICAL INSTRUMENTS

Of Every Description

☞ BUILT BY DAY OR CONTRACT.

Have had five years' experience building Electric Light Apparatus. Facilities for making complete apparatus for 50 Arc Lights a day. Everything made on the **INTERCHANGEABLE** system. Twenty years' experience designing and building Special and Labor-Saving Machinery. Estimates given. Correspondence solicited.

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For Theatres, Churches, Public and Private Buildings.

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WITH

The most complete assortment of Electric Lighting Burners, including Pendant, Ratchet, Argand, Billiard Table, Candle, Automatic, and Vibrators, also Clough, Maxim, Tirrell Ring and Arm Burners, for use with Machine Gas.

BATTERIES, PRIMARY COILS, THREE STYLES OF AUTOMATIC CUT-OFFS, AND ALL SUPPLIES NECESSARY IN FITTING UP BUILDINGS.

ALL APPARATUS PATENTED.

Also, Burglar Alarms, Annunciators, Call Bells, &c.

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IRON AND BRASS MACHINE SCREWS,

Zinc in Sheets and Plate

FOR ELECTRICAL PURPOSES.

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CENTRAL AMERICAN

Telegraph & Telephone Co.

CAPITAL STOCK, - $100,000.

SHARES $10 EACH.

FULL PAID AND NON-ASSESSABLE.

This Company has acquired and owns *all* the telephonic rights formerly the property of the American Bell Telephone Company, Continental Telephone Company, and the Tropical American Telephone Company, Limited, in **Central America** and **Panama.**

The Company **BUYS** its telephones and transmitters, and thereby avoids paying royalties.

A limited number of the shares of the stock is offered for sale at $5 per share.

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—AND—

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THE FITCH

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The cheapest, cleanest, most economical, durable and decidedly the

Best Open-Circuit Battery

IN USE FOR

Telephones, Annunciators, and Electric Bells.

After several years of constant use, it is pronounced to-day as being *far superior* in constancy and power to all other batteries for the above purposes, notwithstanding all statements to the contrary. We have made several valuable improvements in this Battery, among which is the substitution of a *non-corrosive* and *adjustable clamp*, in place of the old style lead cap, which warrants us in saying that the **Chlorine Battery has no equal in the market,** and all we ask is a trial.

PRICE, $1.50 PER CELL.

LIBERAL DISCOUNT TO THE TRADE.

PARTRICK & CARTER,

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THE WEST INDIA

Telegraph & Telephone Company,

LIMITED.

CAPITAL STOCK, - - $150,000.

SHARES, $10 EACH. FULL PAID ARE NON-ASSESSIBLE.

Transfer Office, LONG BRANCH, NEW JERSEY.

T. C. MORFORD,

Register of Transfers.

Operating under license from the TROPICAL and AMERICAN BELL TELEPHONE COMPANY for the Islands of Hayti, San Domingo, Jamaica, Porto Rico, St. Croix, Vieque and Culebra, has been granted concessions from the Governments of the Islands for exclusive right to the exchange system for telephones. This Company **BUYS** their **TELEPHONES** and **TRANSMITTERS,** thereby avoid paying royalties.

A PORTION OF THE STOCK FOR SALE.

Address

The West India Telegraph and Telephone Co.

CHILLICOTHE, OHIO.

DELANO & HAINES,

PROMOTERS and BROKERS,

Formerly of 55 Broadway, have removed to new and commodious quarters in

TEMPLE COURT, 5 BEEKMAN STREET.

We make a specialty of the organization of companies, the development of enterprises of unquestionable merit, and obtaining capital for the same. Sole agency for the *American Diamond Rock Drill* and the *Miner's Hand Drill* for the Republic of Mexico.

EXECUTIVE OFFICES OF

"THE MEXICAN TELEPHONE CO."

AND

The Tropical American Telephone Co.,

(LIMITED.)

Both operating under license from the American Bell Telephone Co.

Valuable Telephone Territory

can be had by parties who can furnish the money requisite to develop it, in the Republic of **Mexico,** the **West India Islands,** and **South America.**

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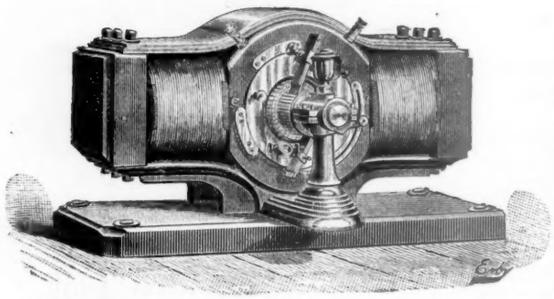

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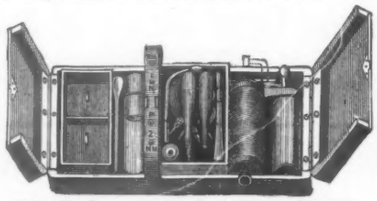

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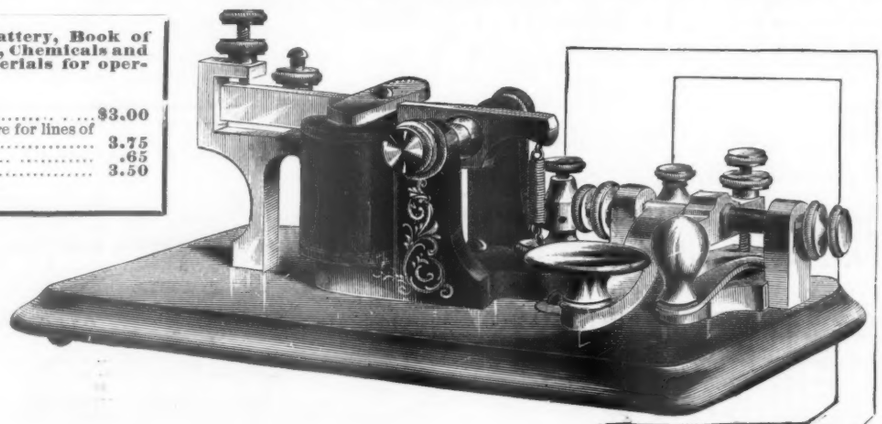

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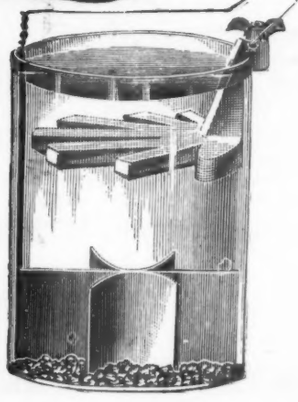

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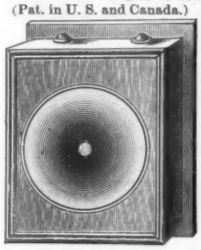

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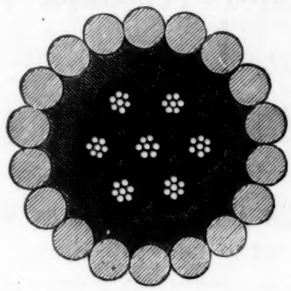

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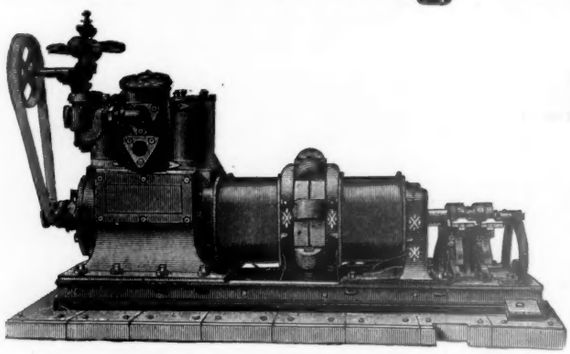

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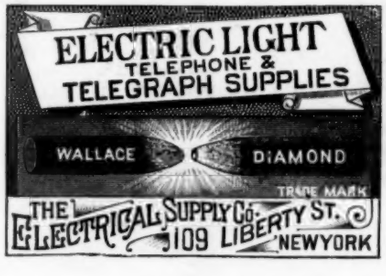

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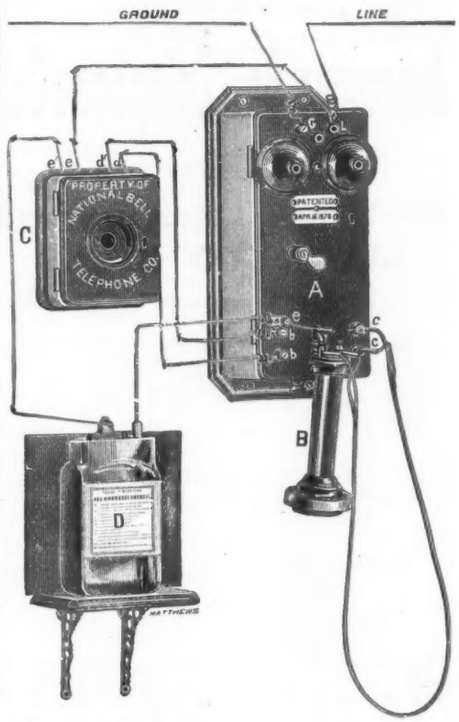

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